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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
CROW, ROBERT THOMAS	

ART UNIT	PAPER NUMBER
1634	

DATE MAILED: 04/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/756,767	KYO ET AL.	
	Examiner	Art Unit	
	Robert T. Crow	1634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-42* is/are pending in the application.

4a) Of the above claim(s) *1-16 and 34-42* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *17-33* is/are rejected.

7)☒ Claim(s) *20 and 33* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 January 2004 and 15 March 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of Group I in the reply filed on 15 March 2006 is acknowledged. Claims 1-16 and 34-42 are withdrawn. Claims 17-33 are under prosecution.

Foreign Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

In addition to Replacement Sheets containing the corrected drawing figure(s), applicant is required to submit a marked-up copy of each Replacement Sheet including annotations indicating the changes made to the previous version. The marked-up copy must be clearly labeled as "Annotated Sheets" and must be presented in the amendment or remarks section that explains the change(s) to the drawings. See 37 CFR 1.121(d)(1). Failure to timely submit the proposed drawing and marked-up copy will result in the abandonment of the application.

Claim Objections

Claims 20 and 33 are objected to because of the following informalities: claims 20 and 33 each contain the recitation "a maker" in line 2 of each of the claims. This appears to be a misspelling of the "marker" as recited in the Specification (e.g., on page 17, paragraph 0100). Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 18 and 21-33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

1. Claim 18 is indefinite in the recitation "a biomolecule (A)" in the last line of the claim. It is unclear what relationship, if any, exists between "a biomolecule (A)" and the first and second biomolecules of independent claim 17.

2. Claims 21-33 are indefinite in claim 21, which recites the limitation "a biomolecule (A)" in the last line of claim 21. It is unclear what relationship, if any, exists between "a biomolecule (A)" and the first and second biomolecules of independent claim 21.

3. Claim 22 is indefinite in the recitation "a molecular weight of 200 to 20000" and the end of the claim. It is unclear what the units of the molecular weight are. It is suggested that the claims be amended to show proper units of molecular weight.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 17-19, 21, 23-24, 26-27, 30, and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Church et al (U.S. Patent No. 6,326,489 B1, issued 4 December 2001) as defined by Hovel et al (U.S. Patent No. 4,401,952, issued 30 August 1983).

Regarding claim 17, Church et al teach the biomolecule interaction measuring method (e.g., binding of a fusion protein to a double stranded DNA on an array and measuring binding; column 14, lines 24-37 and Figure 5) comprising the step of providing a double stranded oligonucleotide array having a plurality of double stranded oligonucleotides (column 14, lines 24-37) immobilized on a metal substrate (e.g., GaAs; column 5, lines 40-45), and measuring the interaction between said double stranded oligonucleotides and a biomolecule or aggregate thereof (column 14, lines 24-37), wherein each of said double stranded oligonucleotides include a first single stranded oligonucleotide and a second single stranded oligonucleotide , said first and second single-stranded oligonucleotides being entirely or partially bonded together in a

complementary manner to form said double stranded oligonucleotides, wherein among said first and second single stranded oligonucleotides, only said first single stranded oligonucleotide is bonded to said substrate (column 1, lines 43-54). Hovel et al define GaAs as a metal (column 1, lines 17-18).

Regarding claim 18, Church et al teach the method of claim 17, wherein said first single stranded oligonucleotide is bonded to said substrate by use of a crosslinking agent including a heterobifunctional polymer molecule expressed by a general formula of X-R-Y, wherein: X is a functional group on a surface of a solid surface of a functional group to be bonded with a functional group introduced to the surface of said solid surface; Y is a functional group to be bonded to a biomolecule (A); and R is a repeating unit of said polymer molecule (e.g., the linker has and amino surface attachment groups [column 6, lines 1-3], the distal end of the linker has a carboxyl group after deprotection [column 6, lines 24-29], and the spacer is the alkylene moiety hexaethylene glycol; column 6, lines 30-51).

Regarding claim 19, Church et al teach the method of claim 17, wherein said measurement is performed using an array which has a background region on which a hydrophilic polymer molecule is immobilized (e.g., the array has diverse polymer sequences at selected regions of the substrate [column 8, lines 1-2], wherein portions of the substrate are protected with a hydrophilic coating; column 8, lines 43-53).

Regarding claim 21, Church et al teach a biomolecule interaction measuring method comprising measuring the interaction between a first biomolecule and a second

biomolecule or aggregate thereof (e.g., binding of a fusion protein to a double stranded DNA on an array and measuring binding; column 14, lines 24-37 and Figure 5) by use of a substrate with a solid surface (e.g., GaAs; column 5, lines 40-45), having said first biomolecule immobilized thereon (column 1, lines 43-54), wherein said first biomolecule is immobilized on said substrate using a crosslinking agent including a heterobifunctional hydrophilic polymer molecule expressed by a general formula of X-R-Y, wherein: X is a functional group on a surface of a solid surface of a functional group to be bonded with a functional group introduced to the surface of said solid surface; Y is a functional group to be bonded to a biomolecule (A); and R is a repeating unit of said polymer molecule (e.g., the linker has and amino surface attachment groups [column 6, lines 1-3], the distal end of the linker has a carboxyl group after deprotection [column 6, lines 24-29], and the spacer is the alkylene moiety hexaethylene glycol; column 6, lines 30-51). Hovel et al define GaAs as a metal (column 1, lines 17-18).

Regarding claim 23, Church et al teach the method of claim 21, wherein R of said heterobifunctional hydrophilic polymer has a structure expressed by a repeating unit $-(-O-R_1-)_n-$, wherein R_1 is an alkylene group, and n is an integer number in the range of 4 to 450 (e.g., and the spacer is the alkylene moiety hexaethylene glycol; column 6, lines 30-51).

Regarding claim 24, Church et al teach the method of claim 21, wherein said functional groups X and Y of said heterobifunctional hydrophilic polymer molecule are amino and carboxyl (e.g., the linker has and amino surface attachment groups [column

6, lines 1-3], the distal end of the linker has a carboxyl group after deprotection [column 6, lines 24-29]).

Regarding claim 26, Church et al teach the method of claim 21, wherein said substrate includes plural kinds of said first biomolecules immobilized thereon in an array arrangement (column 1, lines 43-54).

Regarding claim 27, Church et al teach the method of claim 21, wherein said first biomolecule is nucleic acid (column 1, lines 43-54).

Regarding claim 30, Church et al teach the method of claim 21, wherein said second molecule is a protein (e.g., a fusion protein; column 14, lines 24-37 and Figure 5).

Regarding claim 32, Church et al teach the method of claim 21, wherein said measurement is performed using an array which has a background region on which a hydrophilic polymer molecule is immobilized (e.g., the array has diverse polymer sequences at selected regions of the substrate [column 8, lines 1-2], wherein portions of the substrate are protected with a hydrophilic coating; column 8, lines 43-53).

2. Claim 22 is rejected under 35 U.S.C. 102(b) as being anticipated by Church et al (U.S. Patent No. 6,326,489 B1, issued 4 December 2001) as defined by Hovel et al (U.S. Patent No. 4,401,952, issued 30 August 1983) and Jolly et al (Modern Inorganic Chemistry, McGraw Hill, New York, inside front cover (1984)).

Regarding claim 22, Church et al teach the method of claim 21 as discussed above. Church et al also teach the heterobifunctional polymer molecule has a molecular

weight of 200 to 20000 (e.g., hexaethylene glycol; column 6, lines 30-51). Jolly defines the weights of a carbon atom as 12.011 g/mol, a nitrogen atom as 14.007 g/mol, an oxygen atom a 15.999 g/mol, and hydrogen atoms at 1.008 g/mol. An ethylene glycol moiety (e.g., -OCH2CH2-) would have a molecular weight of 44.053 g/mol; therefore, a hexaethylene glycol unit has a molecular weight of 264.318 g/mol. The addition of an amino terminus (-NH2 weighing 16.02 g/mol) and a carboxylate (-COO-, weighing 44.009 g/mol) results in a molecular weight in the range of 200 to 20000 g/mol.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not

commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

2. Claims 17, 20, 21, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Church et al (U.S. Patent No. 6,326,489 B1, issued 4 December 2001) as defined by Hovel et al (U.S. Patent No. 4,401,952, issued 30 August 1983) in view of Noblett (U.S. Patent No. 6,362,004 B1, issued 26 March 2002).

Regarding claim 20, Church et al teach the biomolecule interaction measuring method (e.g., binding of a fusion protein to a double stranded DNA on an array and measuring binding; column 14, lines 24-37 and Figure 5) comprising the step of providing a double stranded oligonucleotide array having a plurality of double stranded oligonucleotides (column 14, lines 24-37) immobilized on a metal substrate (e.g., GaAs; column 5, lines 40-45), and measuring the interaction between said double stranded oligonucleotides and a biomolecule or aggregate thereof (column 14, lines 24-37), wherein each of said double stranded oligonucleotides include a first single stranded oligonucleotide and a second single stranded oligonucleotide , said first and second single-stranded oligonucleotides being entirely or partially bonded together in a complementary manner to form said double stranded oligonucleotides, wherein among said first and second single stranded oligonucleotides, only said first single stranded oligonucleotide is bonded to said substrate (column 1, lines 43-54; i.e., Church et al

teach the method of claim 17). Hovel et al define GaAs as a metal (column 1, lines 17-18). Church et al are silent with markers indicative of spots.

However, Noblett et al teach the use of microarrays comprising immobilized nucleic acids (column 1, lines 20-30) having marks indicative of spots (i.e., fiducials, Abstract) with the added advantage of allowing positioning and alignment of the substrate for spot analysis and comparison procedures (Abstract).

It would therefore have been obvious to a person of ordinary skill in the art at the time the invention was claimed to have modified the protein binding to double stranded arrays as taught by Church et al with the fiducials as taught by Noblett with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because the modification would have resulted in allowing positioning and alignment of the substrate for spot analysis and comparison procedures as explicitly taught by Noblett (Abstract).

Regarding claim 33, Church et al teach a biomolecule interaction measuring method comprising measuring the interaction between a first biomolecule and a second biomolecule or aggregate thereof (e.g., binding of a fusion protein to a double stranded DNA on an array and measuring binding; column 14, lines 24-37 and Figure 5) by use of a substrate with a solid surface (e.g., GaAs; column 5, lines 40-45), having said first biomolecule immobilized thereon (column 1, lines 43-54), wherein said first biomolecule is immobilized on said substrate using a crosslinking agent including a heterobifunctional hydrophilic polymer molecule expressed by a general formula of X-

R-Y, wherein: X is a functional group on a surface of a solid surface of a functional group to be bonded with a functional group introduced to the surface of said solid surface; Y is a functional group to be bonded to a biomolecule (A); and R is a repeating unit of said polymer molecule (e.g., the linker has and amino surface attachment groups [column 6, lines 1-3], the distal end of the linker has a carboxyl group after deprotection [column 6, lines 24-29], and the spacer is the alkylene moiety hexaethylene glycol; column 6, lines 30-51; i.e., Church et al teach the method of claim 21). Hovel et al define GaAs as a metal (column 1, lines 17-18). Church et al are silent with markers indicative of spots.

However, Noblett et al teach the use of microarrays comprising immobilized nucleic acids (column 1, lines 20-30) having marks indicative of spots (i.e., fiducials, Abstract) with the added advantage of allowing positioning and alignment of the substrate for spot analysis and comparison procedures (Abstract).

It would therefore have been obvious to a person of ordinary skill in the art at the time the invention was claimed to have modified the protein binding to double stranded arrays as taught by Church et al with the fiducials as taught by Noblett with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because the modification would have resulted in allowing positioning and alignment of the substrate for spot analysis and comparison procedures as explicitly taught by Noblett (Abstract).

2. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over by Church et al (U.S. Patent No. 6,326,489 B1, issued 4 December 2001) as defined by Hovel et al (U.S. Patent No. 4,401,952, issued 30 August 1983) in view of Cass et al (U.S. Patent No. 6,312,906 B1, issued 6 November 2001).

Regarding claim 25, the method of claim 21 is discussed above. While Church et al teach metal supports (column 5, lines 40-45), Church et al are silent with respect to a thin gold layer.

However, Cass et al teach nucleic acid probes immobilized on arrays (Abstract, lines 7-10) comprising a gold metal layer on a flat surface (column 15, lines 25-33) with the added benefit that gold allows ease of formation and derivitization with nuclei acids (column 11, lines 40-44).

It would therefore have been obvious to a person of ordinary skill in the art at the time the invention was claimed to have modified the protein binding to double stranded arrays as taught by Church et al with the gold layer as taught by Cass et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because the modification would have resulted in ease of formation and derivitization with nuclei acids as explicitly taught by Cass et al (column 11, lines 40-44).

3. Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Church et al (U.S. Patent No. 6,326,489 B1, issued 4 December 2001) as defined by

Hovel et al (U.S. Patent No. 4,401,952, issued 30 August 1983) in view of Brockman et al (J. Am. Chem. Soc., vol. 121, pp.8044-8051 (1999)).

Regarding claim 28, the method of claim 21 is discussed above. Church et al are silent with respect to surface plasmon resonance.

However, Brockman et al teach the study of DNA protein interactions on arrays on gold surfaces (Title) using surface plasmon resonance with the added benefit that it is a technique well-suited for the monitoring of reversible DNA-protein interactions (page 8044, column 1 paragraph 2, lines 1-3).

It would therefore have been obvious to a person of ordinary skill in the art at the time the invention was claimed to have modified the protein binding to double stranded arrays as taught by Church et al with measurement by surface plasmon resonance as taught by Brockman et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because the modification would have resulted in a technique well-suited for the monitoring of reversible DNA-protein interactions as explicitly taught by Brockman et al (page 8044, column 1 paragraph 2, lines 1-3).

Regarding claim 29, the method of claim 21 is discussed above. Church et al are silent with respect to surface plasmon resonance imaging.

However, Brockman et al teach the study of DNA protein interactions on arrays on gold surfaces using surface plasmon resonance imaging (Title) with the added benefit that surface plasmon resonance imaging allows monitoring of selective binding

to double stranded DNA sequences by a protein (e.g., SSB, page 8051, column 1, paragraph 2, last 3 lines).

It would therefore have been obvious to a person of ordinary skill in the art at the time the invention was claimed to have modified the protein binding to double stranded arrays as taught by Church et al with measurement by surface plasmon resonance imaging as taught by Brockman et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because the modification would have resulted in allowing the monitoring of selective binding to double stranded DNA sequences by a protein as explicitly taught by Brockman et al (page 8051, column 1, paragraph 2, last 3 lines).

4. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over by Church et al (U.S. Patent No. 6,326,489 B1, issued 4 December 2001) as defined by Hovel et al (U.S. Patent No. 4,401,952, issued 30 August 1983) in view of Wiegel (U.S. Patent No. 6,107,034, issued 22 August 2000).

Regarding claim 32, the method of claim 21 is discussed above. Church et al also teach the method wherein said second molecule is a protein (e.g., a fusion protein; column 14, lines 24-37 and Figure 5; i.e., the method of claim 30). While Church et al teach DNA binding proteins that control transcription (column 1, lines 5-10), Church et al do not specifically teach transfer factors.

However, Wiegel teaches the detection of binding of a transfer factor to nucleic acids (e.g., GATA-3 binding to the DNA motif recognized by the protein; column 3, lines 52-63) and the use of nucleic acid arrays (column 6, lines 3-14) with the added benefit that detection of the transfer factor GATA-3 provides a diagnostic test for a hormone responsive tumor (Abstract).

It would therefore have been obvious to a person of ordinary skill in the art at the time the invention was claimed to have modified the protein binding to double stranded arrays as taught by Church et al with the transfer factor GATA as taught by Wiegel et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because the modification would have resulted in providing a diagnostic test for a hormone responsive tumor as explicitly taught by Wiegel (Abstract).

Conclusion

No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert T. Crow whose telephone number is (571) 272-1113. The examiner can normally be reached on Monday through Friday from 8:00 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached on (571) 272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RAM R. SHUKLA, PH.D.
SUPERVISORY PATENT EXAMINER

Robert T. Crow
Examiner
Art Unit 1634